

REMARKS

The Title of the Invention and the claims have been amended to place the application in better form for examination by correcting grammatical type errors resulting from the translation process.

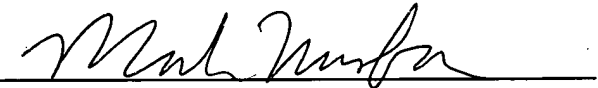
In accordance with 37 CFR 1.125 and M.P.E.P Section 608.01(q), a substitute specification is submitted herewith to ease the burden on the Office in entering the amendments to the specification and to hopefully reduce the number of possible future printing errors. A marked up copy of the specification is attached and the specific amendments have been identified to clearly identify the changes made. The substitute specification is believed to contain the same changes to the specification as indicated in the marked up copy of the original specification. The amendments to the specification have, in general, been made to correct grammatical type errors which have resulted from the translation process. None of the changes made are believed to constitute new matter.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "**Version With Markings To Show Changes Made.**"

Early and favorable consideration are requested.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE**IN THE CLAIMS**

1. (Amended) Apparatus for preventing the reverse insertion [A reverse inversion preventing structure] of a storage battery [used to be inserted] into a battery receiving housing portion formed in an electronic appliance [appliances],

said storage battery, comprising:

a battery housing;

a battery groove portion formed on one end surface [in a first direction] of said battery housing;

a pair of battery electrode terminals provided on said one end surface of said housing formed with said groove portion; and

an engaging [concave] portion of said battery formed in the vicinity of another [other] end surface [in said first direction] on an upper surface of said housing, and

said battery receiving housing portion, comprising:

a battery receiving housing [concave] portion capable of housing said storage battery;

a pair of connection terminals formed on one inner wall [in said first direction] of said battery receiving housing [concave] portion to be connected to said electrode terminals of said storage battery;

a [convex] protruding portion formed [in a protruded manner] at a position corresponding to said groove portion on one inner wall [of said first direction] of said housing [concave portion] portion; and

a receiving housing [an] engaging protrusion formed [in a protruded manner] at a position corresponding to said battery engaging [concave] portion on one inner wall [of said first direction] of said housing [concave] portion, wherein

when said storage battery is normally inserted into said battery housing portion, said battery groove portion and said [convex] protruding portion are engaged with each other, [and] said engaging [concave] portion of said battery and said receiving housing engaging protrusion are engaged with each other, and said electrode terminals and said connection terminals are electrically connected to each other.

2. (Amended) A storage battery [used] to be detachably inserted into a battery housing portion having [formed with] a pair of connection terminals, a [convex] protruding portion, and a engaging protrusion within a housing [concave] portion for housing the storage battery, comprising:

a housing:

a groove portion formed on one end surface [in a first direction] of said housing;

a pair of electrode terminals provided on said one end surface of said housing [formed with said groove portion]; and

an engaging [concave] portion formed in the vicinity of another [other] end surface [in said first direction] on an upper surface of said housing, wherein

when said storage battery is [normally] properly inserted into said battery housing portion, said groove portion and said [convex] protruding portion are engaged with each other, [and] said engaging [concave] portion of said battery and said engaging protrusion are engaged with each other, and said electrode terminals and said connection terminals are electrically connected to each other.

3. (Amended) A battery housing portion into which a storage battery having a housing, a groove portion formed on one end surface [in a first direction] of said housing, a pair of electrode terminals provided on said one end surface of said housing formed with said groove portion, and a engaging [concave] portion formed in the vicinity of other end surface on an upper surface of said housing is inserted, comprising:

a housing [concave] portion for [capable of] housing said storage battery;

a pair of connection terminals formed on one inner wall [in said first direction] of said housing [concave] portion to be connected to said electrode terminals of said storage battery;

a protruding [convex] portion formed [in a protruded manner] at a position corresponding to said groove portion on one inner wall [of said first direction] of said housing [concave] portion; and

an engaging protrusion formed [in a protruded manner] at a position corresponding to said engaging [concave] portion on one inner wall [in said first direction] of said housing [concave portion], wherein

when said storage battery is [normally] properly inserted into said battery housing portion, said groove portion and said protruding [convex] portion are engaged with each

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other, [and] said engaging [concave] portion and said engaging protrusion are engaged with each other, and said electrode terminals and said connection terminals are electrically connected to each other.



TITLE OF THE INVENTION

Structure for preventing

Reverse Insertion Preventing Structure of Storage Battery

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BACKGROUND OF THE INVENTION

5 Field of the invention

This invention ^{generally} relates to a reverse insertion preventing structure, ^{structure for preventing the} and a storage battery ^{of a storage battery} as well as ^{purpose.} ^(The invention relates to)

battery and battery housing portion to be used for the same ^{structure for preventing the} and more particularly to a reverse insertion preventing structure of a storage battery ^{used to be inserted} into a battery

housing portion integrally formed on a charger or electronic appliances ^a such as portable
10 electronic game machines, ^{and etc.} and a storage battery and battery housing portion to be used for the same ^{purpose}

Description of the prior art

BACKGROUND AND SUMMARY OF THE INVENTION

^{A prior art} Conventionally, there is known structure as a reverse insertion preventing art of a ^{exists}
storage battery in which a concave portion and a convex portion are provided in the

15 vicinity ^{the battery} of electrode terminals ^{of a storage battery} and connection terminals of a battery housing portion. ^{- If -} In the case the concave portion and the convex portion are engaged with each other and do not correspond to each other, it is impossible to insert the storage

battery normally. According to this structure, ^{reverse manner} even if the storage battery is inserted ^{from occurring} in a reverse manner, it is possible to prevent an accidental electrical connection between the

20 electrode terminals and the connection terminals ^{the} from occurring due to failure of engagement between concave and convex portions.

^{In this prior art configuration,} However, according to above prior art, since a reverse insertion preventing portion ^{(e.g., the} is formed on only one location at one end surface ^{surface formed with a pair of} terminals) in the longitudinal direction of a storage battery or a secondary battery. ^{Although}

25 ^{an} electrical connection between terminals by the reverse insertion of the storage battery can

be prevented, ~~but~~ it is impossible to prevent the reverse insertion ~~beforehand~~. That is, ~~while~~ ^{from partially occurring} there ~~has been a problem that~~ it is possible to prevent a storage battery from being completely inserted into a battery housing portion ~~as in the~~ ^a normal fashion, ~~but~~ it is impossible to prevent the storage battery from being partly inserted into a battery housing portion, making it difficult for the user to notice the reverse insertion, ~~therefore the user~~ ^{Some users} intends to ~~forcedly~~ ^{insert thereby} press in the storage battery to insert it, and causing the machine ~~to be~~ ^{or injured} injured and the user to be damaged ~~respectively~~.

SUMMARY OF THE INVENTION

Therefore it is a primary ~~object of the present invention~~ ^{feature illustrative embodiments of the} to provide a novel storage battery and a battery housing portion.

It is another ~~object of this invention~~ ^{feature the illustrative embodiments} to provide a reverse insertion preventing ~~structure, and a storage battery and a battery housing portion to be used for the same purpose.~~ ^{for preventing the reverse insertion of a storage battery} The ~~illustrative embodiments~~ ^{a prospective reverse insertion} allowing the user to easily notice in the case the user intends to insert the storage battery

into the battery storage portion reversely, and ~~capable of effectively and~~ ^{to} reliably ~~and~~ ^{and} beforehand preventing reverse insertion of the storage battery and reverse connection of electrode terminals ^{beforehand}.

~~This invention is directed to reverse insertion preventing structure of a storage~~ ^{In an illustrative embodiment for preventing the reverse insertion}

battery used to be inserted into a battery housing portion ~~formed in electronic appliances~~ ^{of various types} and ~~the~~. The storage battery comprises a housing; a groove portion formed on one end surface in a first direction of the housing; a pair of electrode terminals provided on the one end surface of the housing formed with the groove portion; and an engaging concave portion formed in the vicinity of the other end surface in the first direction on an upper surface of the housing. The battery housing portion comprises a housing concave portion capable of housing the storage battery; a pair of connection terminals formed on one inner

5 wall in the first direction of the housing concave portion to be connected to the electrode terminals of the storage battery; a convex portion formed in a protruded manner at a position corresponding to the groove portion on the one inner wall of the first direction of the housing concave ^{portion} ~~portion~~; and an engaging protrusion formed in a protruded manner at a position corresponding to the engaging concave portion on the one inner wall of the first direction of the housing concave portion. When the storage battery is normally inserted into the battery housing portion, the groove portion and the convex portion are engaged with each other, ~~and~~ the engaging concave portion and the engaging protrusion are engaged with each other, and the electrode terminals and the connection terminals are electrically connected to each other.

10 One aspect of ~~this invention~~ ^{the exemplary embodiments} is directed to a storage battery used to be detachably inserted into a battery housing portion formed with a pair of connection terminals, a convex portion, and an engaging protrusion within a housing concave portion for housing the storage battery. The storage battery comprises a housing; a groove portion formed on one end surface in a first direction of the housing; a pair of electrode terminals provided on the one end surface of the housing formed with the groove portion; and an engaging concave portion formed in the vicinity of the other end surface in the first direction on an upper surface of the housing. When the storage battery is normally inserted into the battery housing portion, the groove portion and the convex portion are engaged with each other, ~~and~~ the engaging concave portion and the engaging protrusion are engaged with each other, and the electrode terminals and the connection terminals are electrically connected to each other.

20 ~~The other~~ ^{Another} aspect of the ~~invention~~ ^{exemplary embodiments} is directed to a battery housing portion into which a storage battery having a housing, a groove portion formed on one end surface in a first direction of the housing, a pair of electrode terminals provided on the one end

25

surface of the housing formed with the groove portion, and an engaging concave portion formed in the vicinity of the other end surface on an upper surface of the housing is inserted. The battery housing portion comprises a housing concave portion capable of housing the storage battery; a pair of connection terminals formed on one inner wall in the first direction of the housing concave portion to be connected to the electrode terminals of the storage battery; a convex portion formed in a protruded manner at a position corresponding to the groove portion on the one inner wall of the first direction of the housing concave portion; and an engaging protrusion formed in a protruded manner at a position corresponding to the engaging concave portion on the one inner wall of the first direction of the housing concave portion. When the storage battery is normally inserted into the battery housing portion, the groove portion and the convex portion are engaged with each other; ~~and~~ the engaging concave portion and the engaging protrusion are engaged with each other, and the electrode terminals and the connection terminals are electrically connected to each other.

one exemplar embodiment
According to ~~this invention~~, the storage battery is formed with the groove portion on ~~the~~ one end surface (side surface) in a longitudinal direction of the housing and the engaging concave portion ¹⁵ formed in the vicinity of the other end surface on the upper surface of the housing, ~~and~~ ^{is formed} the battery housing portion is formed with the convex portion on the inner wall of the housing concave portion at the position corresponding to the groove portion of the storage battery, and the engaging protrusion on the inner wall of the housing concave portion ~~at~~ ^{is formed} at the position corresponding to the engaging concave portion of the storage battery. When inserting the storage battery into the battery housing portion, the storage battery is to be inserted obliquely such that the groove portion on the one end surface of the storage battery can be engaged with the convex portion in a state that the engaging concave portion is engaged with the engaging protrusion; and thus, the storage

in the insertion process
battery is pushed. Thus, when the user accidentally intends to insert the storage battery reversely, the user can notice the reversal insertion in the early step because of failure of normal engagement between the engaging concave portion and the engaging protrusion. In this manner, it is possible to beforehand prevent the reverse insertion of the storage battery at an early step. The illustrative embodiments are operable
5 For this reason, it is possible to effectively prevent the reverse insertion of the storage battery and reverse connection of the electrode terminals. Furthermore, a plurality of reverse insertion preventing portions allow the user to visually recognize the structure of the reverse insertion with ease, capable of preventing the damage of the
10 appliances and injury of the user occurring due to the forced reverse insertion of the storage battery.

The above described objects and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

15 1(a)-1(c) are
Figure 1 is a cross-sectional view showing a state when a storage battery of one embodiment according to the present invention is inserted into a battery housing portion;

2(a)-2(c) are
20 Figure 2 is an illustrative view showing the storage battery of one embodiment of the present invention;

Figure 3 is a top plan view in the case of the battery housing portion of one embodiment of the present invention is applied to a battery charger; and

4(a) and 4(b) are
25 Figure 4 is an illustrative view showing the case of the battery housing portion of one embodiment of the present invention is applied to a portable electronic game machine as an example of electronic appliances.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

1(a)-(c) are
Figure 1 is a cross-sectional view showing a state *where* in accordance with *an exemplary* embodiment of the present invention is inserted into a battery housing portion.

Specifically, Figure 1(a), Figure 1(b) and Figure 1(c) respectively show a state before inserting the storage battery, a state with the storage battery *position* being oblique for insertion, and a state with the storage battery normally inserted. Figure 2 is a view showing ~~the~~

~~storage battery of one embodiment of the invention. Specifically, Figure 2(a), Figure 2(b)~~

storage battery in accordance with an exemplary embodiment of the present invention
and Figure 2(c) respectively show a side view, a top plan view, and a bottom view of the storage battery. Figure 3 is a top plan view in the case the battery housing portion of one embodiment of the invention is applied to a battery charger.

Referring to Figures 1 and 2, the storage battery 10 includes a housing 11. The housing 11 is formed with a groove portion 12 for preventing reverse insertion on the one end surface (side surface) in the longitudinal (the first) direction of the housing 11, and a pair of electrode terminals 16a and 16b in such a manner that the groove portion 12 is sandwiched between them. The groove portion 12 is formed *such* in a manner that an opening portion thereof becomes *progressively* larger toward the bottom side (downwardly) to be readily engaged with a convex portion 22 formed on the after-mentioned battery housing portion 20. *Meanwhile, the battery* the housing 11 is formed with a first engaging concave portion 13 in the vicinity of the other end surface (side surface) in the longitudinal direction on the upper surface thereof. The first engaging concave portion 13 is formed in a notch oblique from the upper surface to the other end surface of the housing 11. Furthermore, the housing 11 is formed with a second engaging concave portion 14 on the bottom portion. The second engaging concave portion 14 is formed with a trapezium-shaped recess or hollow when viewed from the front at such a position *a* little nearer the other end surface than the center of the bottom. A surface of a insertion direction side of the housing 11 is obliquely

shaped

processed in such a manner that the width of an opening portion of the second engaging concave portion 14 is wider than that of a second engaging protrusion 24 formed on the bottom of the after-mentioned battery housing portion 20 in order that the storage battery 10 can be smoothly inserted into the battery housing portion 20. Furthermore, the housing 11 is formed with a knob portion 15 on the upper end portion of the one side of the longitudinal direction of the housing 11.

Referring to Figures 1 and 3, the battery housing portion 20 has a housing concave portion 21 having a plane shape little larger than that of the battery 10 in order to insert the battery 10 thereinto. The housing concave portion 21 is formed with a convex portion 22 to be engaged with the groove portion 12 of the storage battery 10 in a protruded manner on the inner wall of the one side of the longitudinal direction thereof. The housing concave portion 21 is formed with a first engaging protrusion 23 to be engaged with the first engaging concave portion 13 on the upper portion of the inner wall of the other side of the longitudinal direction thereof. Furthermore, the housing concave portion 21 is formed with a second engaging protrusion 24 to be engaged with the second engaging concave portion 14 in a manner *protruding* ~~protruded~~ upwardly from the bottom. It is

noted that the housing concave portion 21 is formed with a pair of connection terminals 25a and 25b for electrically connecting ~~with~~ *to* electrode terminals 16a and 16b *such* ~~in a manner~~ that the convex portion 22 is sandwiched between them. In addition, the above *illustrative* embodiment shows the case *where* ~~that~~ the second engaging concave portion 14 and the second engaging protrusion 24 are formed nearer the other side surface (leftish) *rather* than the center of the longitudinal direction, but these portions 14 and 24 *alternatively* may be formed nearer the one side surface (rightish) oppositely.

Next, Referring to Figure 1, ~~explanation will be made on the case~~ the storage battery 10 is inserted into the battery housing portion 20. *as follows* When inserting the storage battery 10

in the battery housing portion 20, the ^{battery} ~~situation~~ of Figure 1(a) is ^{moved to the position shown in} changed to that of Figure 1(b). Firstly, ^{first} the storage battery 10 is ^{one} inserted into the battery housing concave 21 with the ~~other~~ ^a side surface of the housing 11 inclined ^{the other} little downwardly than ^{oriented} one side surface in such a manner that the first engaging concave portion 13 is ~~made~~ ^{made} oblique downwardly to be engaged with the first engaging protrusion 23 from the top of the battery housing portion 20. Then, as shown in Figure 1(c), pushing the ~~one~~ ^{other} side surface of the housing 11 downwardly, the storage battery 10 is inserted into the battery housing portion 20 while the groove portion 12 of the storage battery 10 is guided by the convex portion 22. At this time, since the surface of the inserting side of the second engaging concave portion 14 is cut off obliquely, smooth engagement is obtained without being caught by the second engaging protrusion 24. Upon inserting the storage battery 10 into the battery housing portion 20, the electrode terminals of the storage battery 10 and the connection terminals of the battery housing portion 20 are brought into contact with each other, and electrically connected to each other.

Accordingly, in ~~the case~~ the storage battery 10 is inserted into the battery housing portion 20, positioning is firstly performed in a state that the first engaging concave portion 13 ^{is} engaged with the first engaging protrusion 23. Then, since the groove portion 12 is guided by the convex portion 22, and at the same time, the second engaging concave portion 14 is inserted into the second engaging protrusion 24 with engagement therebetween, it is possible ^{early in the insertion process any} to ~~early and~~ reliably notice the reverse insertion, and thus, to ~~thereby~~ ^{thereby} prevent the storage battery from being forcedly pushed-in.

~~On the other hand, in the case~~ ^{When} the user intends to insert the storage battery into the battery storage portion 20 with the one end surface and the other end surface of the longitudinal direction of the housing 11 inverted, i.e., with the surface formed with the groove 12 down, since the first engaging concave 13 is not formed on the end surface or

side surface formed with the groove 12 of the housing 11, it is impossible to engage the first engaging concave portion 13 with the first engaging protrusion 23, and the second engaging protrusion 24 is brought into contact with the bottom surface of the storage battery 10 and the convex portion 22 is also brought into contact with the other end

5 surface not formed with the groove 12 of the housing 11. Thus, it is possible to ^{early in} notice the reverse inversion ^{process} ~~in the early step~~ before a part of the storage battery is inserted into the battery housing portion 20, ^{to thereby} ~~capable of preventing~~ the reverse insertion early and reliably.

^{In accordance with the illustrative embodiment,}
By forming the groove portion 12, the first engaging concave 13 and the second engaging concave 14 ^{are formed} on the housing 11 of the storage battery 10 and by forming the

10 concave portion 22, the first engaging protrusion 23 and the second engaging protrusion 24 at the positions respectively corresponding to the groove portion 12, the first engaging concave 13 and the second engaging concave 14 ^{are formed} on the housing concave portion 21 of the battery housing portion 20. ^{Thus,} even when the user accidentally intends to insert the storage battery 10 upside down or laterally inverted, because the groove portion 12, the first

15 engaging concave 13, and the second engaging concave 14 are not engaged with the convex portion 22, the first engaging protrusion 23, and the second engaging protrusion 24, it is possible to reliably prevent the reverse insertion of the storage battery 10 into the battery housing portion 20. Meanwhile, ^W when the one end surface of the longitudinal

20 direction of the housing 11 of the storage battery 10 is pushed into the battery housing portion 20, i.e. the storage battery 10 is completely housed in the battery housing portion 20, the electrode terminals 16a and 16b of the storage battery 10 and the connection terminal 25 of the battery housing portion 20 are in contact to be electrically connected to

25 each other. Accordingly, it is possible to prevent the electrical connection with the storage battery 10 inserted into the battery housing portion 20 by halves. Furthermore, a plurality of concave portions (convex portions protrusions) for preventing the reverse

insertion allow the user to visually recognize the structure of the reverse insertion with ^{to thereby prevent} ease, ~~capable of preventing~~ the reverse insertion of the storage battery 10 ^{before it occurs} beforehand.

Accordingly, ~~the damage of the appliances~~ ^{to} and the injury ~~of~~ the user occurring due to the reverse insertion of the storage battery 10 can be prevented.

5 It is noted when the user intends to remove the storage battery 10 from the battery housing portion 20, it can be removed by holding and lifting the knob portion 15 formed on the upper end portion of one side of the longitudinal direction of the housing 11.

Referring to Figure 3, a battery charger includes a housing 31. The housing 31 has a cover 32 openably formed on the one side surface and the above described battery
10 housing portion 20 is integrally provided at the center thereof. When charging the storage battery 10 with the charger 30, the cover 32 is closed, and a plug (not shown) formed on the bottom of the battery 30 is inserted in a socket for commercial power in a state ^{where} ~~that~~ the storage battery 10 is normally inserted into the battery housing portion 20 in a manner
15 that the groove portion 12, first engaging concave portion 13, and second engaging concave portion 14 formed on the housing 11 of the storage battery 10 are respectively engaged with the convex portion 22, first engaging protrusion 23, and second engaging protrusion 24 formed on the housing concave portion 21 of the battery housing portion 20.

Figure 4 is a view showing the case the battery housing portion of one
20 embodiment of the invention ^{when} ~~is~~ applied to a portable electronic game machine as an example ^{on} ~~of~~ electronic appliances. Specifically, Figure 4(a) and Figure 4 (b) show a front view and a rear view of the portable electronic game machine, respectively. Referring to Figure 4 (a), the portable electronic game machine 40 is provided with an LCD display portion 42 for displaying an image of games, etc. on the surface of a housing 41 and an
25 operating portion 43 on both sides of the housing 41. Meanwhile, the housing has a slot

or an insertion port (not shown) for detachably inserting a cartridge (not shown) storing a game program at the upper surface thereof.

Next, referring to Figure 4 (b), the housing 41 has the *previously described* battery housing portion 20 integrally formed at a lower portion of the rear thereof. Using the portable electronic game machine 40, a cover (not shown) is closed and a power switch (not shown) is turned
5 on with the storage battery 10 normally inserted into the battery housing portion 20.

Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited
10 only by the terms of the appended claims.